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PACIFIC MAIL LOSSES.

An aftermath of the San Francisco earthquake and fire of April, 1906, is noted in the annual report of the Pacific Mail Steamship Co., a subsidiary of the Southern Pacific railroad, for the fiscal year ended April 30, which records a heavy decrease. This was a result of the diversion of traffic to other channels during the re-establishment in San Francisco of stores, warehouses, hotel accommodations and other accessories for carrying on extensive commerce. This report recorded, as a consequence of the falling off in the operations of its steamers, big losses in gross and net earnings and surplus for the year.

At the annual meeting of the shareholders Henry W. De Forest and Robert Goelet were elected directors to fill vacancies caused by the resignation of George J. Gould and James Speyer. The company's income account for the fiscal year ended April 30 compared with those for the two previous years follows:

	1907.	1906.	1905.
Gross	$4,839,244	$5,724,337	$5,775,782
Expenses	4,294,548	4,895,356	4,480,770
Net	$ 544,696	$ 828,981	$1,295,012
Dep. rep. etc..	414,291	546,096	867,356
Surplus	$ 130,405	$ 282,884	$ 427,656

The earnings and expenses in detail compare as follows:

GROSS.			
Receipts from steamers	$4,659,046	$5,512,917	$5,592,822
Receipts from mails	15,180	15,180	15,180
Miscel. col.	134,756	168,363	155,304
Inc. from invst	30,262	27,877	12,477
Total gross..	$4,839,244	$5,724,337	$5,775,783
EXPENSES.			
Steamer ex.	$3,496,125	$4,102,207	$3,624,136
Agency ex.	568,973	508,414	550,001
Gen. ex. etc.	100,815	274,695	260,356
Miscellaneous	2,768	2,044	12
Interest	125,867	79,915	46,266
Total	$4,294,548	$4,895,356	$4,480,771

In his preliminary report to the stockholders, E. H. Harriman, president of the company, says in part:

"Part of the decrease resulted from the fact that the trans-Pacific line made four less trips this year than last, but by far the greater part was the result of the diversion of traffic to other channels during the re-establishment in San Francisco of its commerce, which was entirely destroyed or scattered by the fire of April, 1906; also from the lower rates on ocean tonnage and from the unsettled civil condition in the Central American republics, which reduced materially the company's traffic in these states.

"During the summer of 1906, the two chartered ships, Manchuria and Mongolia, met with serious disaster, the former on Oahu Island and the latter on Midway Island. Both vessels and cargoes were saved, but the Manchuria was damaged so that she was unable to resume service, and was put in dry dock for repairs last November. She was to go into service June 1, but is still held in dry dock by the strike in San Francisco. The Mongolia was repaired temporarily and resumed service after a slight delay, but permanent repairs will be made to her when the Manchuria goes into service. The cost of these repairs are borne by the owner of the ships."

HAMBURG-AMERICAN LINE.

Sixty years in existence, the Hamburg-American Line today can point to the largest ocean steamship fleet in the world, whose house-flag is known on every sea and in the chief port of every continent. It is difficult to realize what this veritable armada of commerce has accomplished. On May 27, 1847, the company was established with a modest capital and high hopes. Three clipper ships were built and the battle with the British began for control of ocean transportation. The Deutschland, Nordamerika and Rhein were the pioneer vessels. The Elbe, Oder and Donau followed, and the "fleet" averaged about 717 tons a vessel. A score of cabin passengers, 200 steerage passengers and a little freight was the full complement of each. The time for a trip averaged from 29 to 40 days. The Kaiserin Auguste Victoria, which made her maiden trip the other day carried 570 first-class, 300 second-class, 250 third-class and 800 steerage passengers, in addition to a crew of 650 and all without overcrowding.

In 1854 the company adopted steam power, and in 1887, the twin-screw system. This latter occasion was the first application of this method of propulsion for merchantmen. Having solved in the manner outlined the question of speed and service, the company next turned its attention to increasing the comfort and ease of its patrons. Seasickness was measurably overcome by building vessels of great burden—13,000 tons, which later was increased to 16,000 tons in the case of the Deutschland, and to 23,000 tons in the case of the Amerika.

Every modern precaution for speed and safety is installed in the vessels of the Hamburg-American Line. Its fleet consists of 371 vessels in all, of which 166 are ocean-going, with a total tonnage of 956,693 tons. Of this number 23 are twin-screw steamships. Fifty-eight different services are maintained, and in 1906, 1,256 round trips were completed, carrying 33,926 passengers and 5,804,798 tons of freight.

Hollis Burgess, 10 Tremont street, Boston, has sold the famous old schooner yacht Foam, owned by Frederick L. Gay, of Brookline, Mass., to Charles D. Vail, of Port Monmouth, New Jersey. The Foam is 88 ft. 7 in. over all, 82 ft. 3 in. water line, 21 ft. beam and 7 ft. 2 in. draught. She was built by Robert Palmer at Noank, Conn., in 1863 and has had a very varied career. In the civil war she was used as a privateer and was noted for her speed and seagoing qualities.

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SECTIONAL WORK IN SHIP-BUILDING.

On May 3 Mr. J. L. Twaddell, who is well known in the ship building world as manager of Palmer's ship yard at Jarrow-on-Tyne, read a paper at a meeting of the North-East Coast Institution of Engineers and Shipbuilders on "Sectional Work in Ship Construction." In almost every branch of industrial engineering, and indeed in the manufacture of almost every commodity during the last 20 or 30 years, great advancement had been made, he said, both in output and quality, while, at the same time, cost of production had been reduced, notwithstanding the fact that the position of the workman had greatly improved in the matter of the number of hours worked per day as also in the wages he received for his work, and the sanitary condition of the workshop. No doubt this state of affairs, so far as the artisan was concerned, would be claimed in some quarters as being brought about by the better organization of the men into trades unions. However, the betterment of the artisan running parallel to increased production called for further explanation, and this, unquestionably, was to be found in improved facilities and better organized control on the part of the managers of our large industrial concerns, one of the chief features of which was the subdividing of the work to be done into a number of sections, thus resulting in the workmen specializing in one branch of work only. For example, in the early days of mechanical engineering, following the advent of steam, with the multitude of machines for all purposes which it brought in its train, all the work of manufacture was for a long time performed by millwrights alone, but by a gradual process of evolution this had all been changed, and whereas formerly a mechanic not only manipulated his piece of work in the lathe or other machine, but completed what fitting it required at the vise bench and even followed it to the engine or machine of which it formed a part and erected it in position, in the larger shops, at any rate, all machining was done by a set of men who did nothing else, and similarly all fitting and erecting by other sets of men, so that greater expertness had been gained by the men on the particular work in which they had specialized. A somewhat analogous case was that of the shipwright who, in the good old days of the wooden walls, was, with the exception of the blacksmith and perhaps the painter, the only skilled workman employed in the construction of a ship. The substitution of iron for wood in the main structure very soon changed all this; and with the advent of iron for ship building purposes came the machinery necessary for its manipulation, which resulted in the employment of quite a number of separate trades, the principal of which was that of the iron ship builder, who, in the early days of his craft, took a somewhat similar position with regard to ship building to that of the millwright in relation to engineering, so that he not only marked off the plates or bars, but punched and sheared them at the machine, fitted them in the ship, and even riveted them, afterwards calking the seams or butts as required. In other words, the iron ship builder of the early days was drawn from the ranks of the boilermakers, where each man was capable of doing the work of plating, riveting, and calking, and these men brought this practice with them into the work of iron ship building. The rapid development of this industry, however, soon resulted in this work being to a large extent subdivided; thus lads were apprenticed as platers only, or as riveters or calkers, so that out of one skilled trade there sprang three distinct branches, and this division had obtained in the iron department of the ship yard for many years. Circumstances were, however, rapidly undergoing a change which would inevitably call for a further subdivision, if this country was to maintain its prestige as the leading ship building nation of the world; for it could not be denied that in recent years the development of this important industry in foreign countries had begun to be felt in British yards. Here, again, altered conditions and improved facilities provided the necessity for readjusting of the modus operandi in manipulating the material forming the structure, just as similar influences brought about changes in other trades, not only without detriment to the artisan, but, on the contrary, to the improvement of his position.

The expensive and tedious process of fairing and keeping fair the frames and beams until sufficiently secured by the plating, by means of wood ribbands, was being superseded in many yards by the more direct method of fairing by the plating itself. Thus tank side plating was marked from templates prepared from scrieve boards, so that when erected in position they brought the ends of tank floors fair. In many yards molds were prepared in the mold loft for deck stringers, as also for a strake of deck plating alongside casings and hatches, from which the plates were marked and punched, it might be, before the vessel was in frame, so that these plates served to fair the deck instead of ribbands. Similarly a strake of side plating was used to fair the frames in some yards by the early preparation of proper molds, and even the bottom shell plating was being punched and placed in position before the floors were erected. This method necessitated terms being made with the plater for marking and punching alone, allowing, of course, for molds being supplied him, so that to this extent sectional work had already in some measure been adopted. With the increasing dimensions of ships, and the larger sizes of plates and bars used in their construction, had come the necessity for dealing with them mechanically instead of manually; hence the introduction of power-driven cranes both on the ground in the building yard and over the building berths. It followed as a natural sequence that firms with sufficient enterprise to expend considerable capital on these appliances looked for a reasonable return on their expenditure, and in order to obtain this the time appeared to be approaching when the old order must give way to the new, and the custom which prevailed in ship yards where no such appliances were provided, as in the case of many ship yards, both on the Clyde and the North-East Coast, the platers' piece-work price, which included the erecting of the material in position in the structure, needed to be re-adjusted, at any rate, in those yards where special facilities were provided which eliminated the necessity for a full squad of laborers or helpers, as they were called, dragging the piece of material by main force into position. In fact, there seemed no real reason, at any rate in yards under the new conditions, for the plater, as a member of the squad, following the material to the ship at all, as it could be placed in its exact position by mechanical means, and it was a question whether the platers' work ought not to finish after the punching, shearing and rolling was done, as no special skill was required for the operation of placing in position; certainly no more than was required in the case of the main frames or deck beams, which it had never been the practice of the platers who prepared them to follow to the ship and secure in position, for even in the case of plates that was all that was done, as the platers did not complete

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the screwing up ready for riveting. That was left for the squad of riveters who followed. At the same time, it was not suggested that the plater's earning-power for the work he performed should be reduced; on the contrary, it was obvious that the more rapid assembling of the various pieces of the structure on the ship would afford more steady employment for the plater who did the marking, as also the punching, as the present somewhat primitive system resulted often in long delays before a particular plate was in position so as to enable the marker to proceed with another. Unfortunately, it had not been usual for the members of trades unions to take a broad view of things when modifications in existing practice became necessary through changed circumstances, and this was to be regretted, as their interests were so identified with those of the employers that it was obvious no measure of prosperity could attend the one without the other participating. Although not desirous of bringing into the discussion of the subject the position of the Royal dockyards, Mr. Twaddell called attention to the fact that while these were the only yards in the country where practically absolute control was in the hands of the management, both as regarded the subject under review and other important matters, the labor leaders, of whom they had such a strong representation in the House of Commons, lately petitioned the government praying that more work should be given to the government dockyards and arsenals. A striking object lesson had been given to the country and the shipbuilding world lately in the rapid construction of H. M. S. Dreadnought, and not a little of the success attending the achievement had been due to the freedom of action on the part of the authorities at the dockyard in regard to the number and class of men employed and to the quantity of work allocated to each man. Was it too much to expect that this freedom should be extended to outside firms?

OUR SHIPS IN 1906.

BY WALTER J. BALLARD.

There is wealth of American interest in the just issued 1906 report of the Hon. Eugene T. Chamberlain, United States Commissioner of Navigation. It is a bound volume of 314 pages, every one of which contains matter of moment to Americans. Space precludes publication in these columns of more than a brief synopsis, and a few of the tables, or extracts therefrom. The growth in total documented shipping of the United States in the past ten fiscal years has been:

	GROSS TONS.
1906	6,675,569
1896	4,703,880

Increase in 10 years, 1,971,689 tons, or 42 per cent. Analyzed, the comparison is:

Where trading.	1906 Gross tons	1896 Gross tons	Increase Gross tons
Atlantic and Gulf	3,433,145	2,667,313	765,832
Great Lakes	2,234,432	1,324,068	910,364
Pacific	840,035	437,972	402,063
			2,078,259
			Decrease
Mississippi System.	167,957	274,527	106,570
Totals	6,675,569	4,703,880	1,971,689

Atlantic and Gulf ships increased 29 per cent in the ten years; Pacific ships increased 92 per cent; Great Lakes ships increased 69 per cent; while boat tonnage on the Mississippi system decreased 39 per cent.

"On the Pacific coast," says the commissioners, "our shipping has in fact doubled in the ten years, for the fleets of the Pacific Mail Steamship Co., and of several other corporations, having their main offices in the east, are wholly employed on the Pacific ocean, though the vessels' papers are credited to the east. A third of our merchant marine is employed on the great lakes. Our total tonnage has increased 42 per cent in the past ten years, a growth creditable in itself, but not so great as the increase of shipping generally." *Lloyd's Register* gives the following figures of the world's shipping for 1905 and 1906:

	Steam Gross tons	Sail Net tons	Total Tons
1906	31,744,904	5,809,113	37,554,017
1896	11,737,875	7,876,264	25,614,089
Increase	14,007,079	*2,067,151	11,939,928
Per cent..	78	*26	47

*Decrease.

Our increase of 42 per cent in total shipping, leaves us five per cent short of the world's total increase. It is decidedly un-American to be short of anything which we ought to have.

These figures are practically confirmed by *Bureau Veritas*, an established authority on shipping, and which has fuller returns of sailing vessels than has *Lloyd's Register*. The figures given by *Bureau Veritas* are:

	Steam Gross tons	Sail Net tons	Total Tons
1906	30,256,336	7,550,273	37,806,609
1896	17,089,596	9,135,560	26,225,156
Increase	13,166,740	*1,585,287	11,581,453
Per cent..	77	*17	44

*Decrease.

The two most trustworthy authorities thus show that the United States has fallen from two to five per cent behind the rest of the world in shipping in the ten years in spite of our increase of 1,971,689 tonnage. This, in the face of our vast industrial and commercial advance is lamentable, as we have outstripped several competitors, and have come very close to our leading competitor, Great Britain, in foreign trade.

"If we turn," says the Commissioner, "solely to the figures of our domestic or coasting trade, from which on the lakes foreign competition is barred by nature and on the seacoast by early acts of congress, our shipping has advanced as rapidly as the shipping of the rest of the world."

American vessels in domestic trade:

	Gross tons
1906	5,735,483
1896	3,858,927
Increase in 10 years	1,876,556
Per cent of increase	48

Or, one per cent more than *Lloyd's Register* gives for the world's shipping increase, and four per cent more than is allowed by *Bureau Veritas*.

Compare that good showing with the following record of our ten years' advance in American ships engaged in foreign trade, both steam and sail:

	Gross tons
1906	939,846
1896	844,954
Increase in 10 years	94,532
Per cent of increase	11

That this poor showing is particularly due to the inability of the sailing ship to compete with the more economical and efficient steamer is shown by the following analysis:

	1896 Gross tons	1906 Gross tons	Increase per cent
Steam (metal)	226,503	521,480	131
Steam (wood)	38,379	69,805	87
			Decrease
Sail	580,072	348,201	41

In this record steel steamers for foreign trade show an increase of 294,977 gross tons in the ten years. This includes sixteen large ocean steamships, aggregating 134,080 tons, which were built in anticipation of the passage of the Hanna-Payne bill which failed in the house in 1902. Since the act of 1900 the American-Hawaiian Steamship Co. has commissioned seven steamers of 48,447 tons. Since the war with Spain, the New York & Cuba Mail Steamship Co. has built seven steamers of 39,156 gross tons, and the American Government line to Panama has been established. These account for thirty registered steamers of 221,685 gross tons. Four other steamers, the Minnesota, Dakota, Siberia, and Corea, of 63,992 aggregate gross tons have been built since 1898.

Thus we see that the ten years' increase in steel steamers is due to specific causes, says Mr. Chamberlain, quite apart from general maritime growth here or abroad. "Taken as a whole the figures show inconsiderable progress from normal causes in shipbuilding here for the foreign trade. Incidentally, they show a reason for the lessening interest of Americans in seafaring life. That life for most of the crew nowadays must be spent in the hold of a steamer shoveling coal."

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STATISTICS FOR THE YEAR.

Our total shipping increase in 1906 fiscal year over 1905 fiscal year, was:

	Vessels	Gross tons
1906	25,006	6,675,569
1905	24,681	6,456,543
Increase, one year...	325	219,026

The distribution in 1906 is:

	Vessels	Gross tons
Atlantic and Gulf Coast	17,477	3,427,646
Northern Lakes	3,052	2,234,432
Pacific Coast	2,787	817,572
Western Rivers	1,582	167,957
Porto Rico	59	5,499
Hawaiian Islands	49	22,463
Totals	25,006	6,675,569

All these show joint increases over 1905, except "western rivers," which gained 56 in vessels but lost 6,362 in tonnage, and "Hawaiian Islands," which lost seven in vessels, and 6,159 in tonnage.

THE SAILORS WE HAVE.

Masters	25,006
Crews of steamers	96,897
Crews of sail vessels, barges and canal boats	53,693
Crews not reported of 728 "Sunday boats"	1,604
Total sailors	177,200

This total means all the documented merchant vessels and yachts of the United States.

CONSTRUCTION IN 1906.

During 1906 fiscal year, 1,221 vessels of 418,745 gross tons were built and documented here, compared with 1,102 vessels of 330,316 tons for the preceding fiscal year. This was an increase of 119 vessels of 88,429 aggregate tonnage. The steam steel tonnage increase was 118,790, but all other forms of construction together showed a decrease. New vessels of 1,000 gross tons or more built and officially numbered were 58, representing 66 per cent of the total output of our shipyards in the year, nearly all of which work was done along the shores of the great lakes. That emphasizes the immense commercial value of our "Inland Seas."

The commissioner strikingly says: "Unless strikes, delays in furnishing structural steel, or other unforeseen difficulties prevent, the output of steel merchant vessels during the current fiscal year will be greater than ever before in the history of this country, and it is probable that the total tonnage of all types of vessels for the year will exceed 525,000 gross tons, the largest tonnage built since 1855. From July 1 to November 19, of this fiscal year, 203,000 gross tons have been built and numbered. If that rate be maintained for the rest of the year the output of our shipyards will be the largest in our history. Work in progress is more evenly distributed among the yards of the seaboard and the great lakes than for some years."

On July 1, 1905, only seven ocean steamships of 1,000 gross tons or upwards, aggregating 38,000 tons, were under contract or construction. One year later, July 1, 1906, thirty-two such ocean steamships, aggregating 131,000 gross tons, were similarly reported. So many ocean steel steamers, however, have never before been under contract in the United States as at the present time.

This improvement in the outlook of our shipbuilding industry is most encouraging.

ITEMS OF GENERAL INTEREST.

The combined excursion boat and tug Worcester, propelled by gasoline, was blown up and burned at Laurel, Del., recently, and it was necessary for the citizens to make a fight to save the town from the flames, which threatened to communicate thereto.

The new naval dry dock at League Island navy yard is about complete, all the machinery having been installed and ready for use. The sea wall, however, is likely to be under construction for several months yet. The work has been in progress for seven years and has cost $1,200,000.

The state of Rhode Island is to present the battleship Rhode Island with a bronze tablet and the citizens of that state have planned to present the vessel with a silver service, the cost of which has been raised by popular subscription. The presentation is to be made by Governor Higgins.

The use of oil for fuel on the United States torpedo boat Gwin has been abandoned after a trial lasting more than a year. The highest speed obtainable with oil fuel was but 16½ knots, while a boat of duplicate construction, which was fitted for the burning of coal showed a speed of 21 knots.

The eleventh annual commencement of Webb's Academy and Home for Ship Builders was held in the academy chapel at Fordheim Heights, New York, June 6. Stevenson Taylor, president of the board of trustees, presided. Robert Watchorn, commissioner of immigration at Ellis island, made the principal address.

After months of trial, supervising inspector Capt. Ira Harris, of the board of steamboat inspectors of the port of New York, has decided the question as to who was at fault in the collision between the Commercial Towboat Co.'s tugs Joshua Lovitt and the Erie ferryboat Paterson by exonerating Capt. George S. Funstan, of the Paterson, and suspending Capt. Charles E. Baker for sixty days.

The summer conference at the Naval War College at Newport, R. I., opened June 3 with Rear Admiral John P. Merrill, U. S. N., as president. The naval officers who will comprise the class are as follows: Capt. Thomas C. McLean; Commdrs. H. W. Harrison, L. F. Parker, H. S. Knapp, F. F. Fletcher, A. Reynolds, J. M. Robinson, C. J. Badger and J. C. Colwell; Lieut.-Commdrs. R. F. Lopez, R. K. Crank, O. K. Koester, C. T. Jewell, Hugh Dodman and C. M. Stone and Lieut. F. H. Prumby.

It is stated that the navy department has been obliged to give up the plan to transform the cruisers San Francisco and Baltimore into mine ships, it having been determined that it will require the expenditure of more than $200,000 on each and thus would have to be authorized by congress. A vessel which is properly equipped is enabled to lay floating and submerged mines in sufficient numbers to insure protection, in a day or two, whereas it would take many days or even weeks for an ordinary vessel to accomplish the same work.

An effort is being made by Surgeon-General Rixey to have the hospital ship Relief put in commission for the care of the sick of the navy, the naval hospital at Norfolk being in such condition that it is to be rebuilt before it can be made to serve its purpose. Since Jan. 1, last, it has been necessary to transfer 109 cases from the hospital at Norfolk to other naval hospitals and it is believed that with the hospital ship stationed there for the next two years the care of the sick and injured of the station can be much facilitated.

The Austrian government has increased its annual subsidy to the Austrian Lloyd Steam Navigation Co. from $1,181,460 to $1,486,586 for a period of 15 years, the new contract calling for increased speed to the Levant and to the Orient. The government refunds the toll fees paid by the company for the passage of its ships through the Suez canal and the steamship company is to pay into a pension fund for its employes a minimum of $50,750 annually and is to institute an insurance fund for the aged sailors of the crews of its ships not later than 1910.

The steel steamer Charles Weston of the Weston Transit Co.'s fleet ran on the rocks at Outer Island, Lake Superior, last week, but was released after throwing overboard about 1,200 tons of her coal cargo. The steamer was resting on a flat rock and was not much injured.

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SAIL VESSELS MEETING OR CROSSING.

The rules for sail vessels meeting or crossing apply only where both vessels are under way, but a vessel is considered as "under way" within the meaning of the rules when she is not at anchor, or made fast to the shore or aground. Thus it is held that a vessel hauled to with helm lashed and making both headway and leeway, and a vessel engaged in reefing, are under way. But a vessel floating down a river with her anchor down to check her way is not a vessel under way.

A vessel is said to be closehauled when she is lying as near to the wind as she can be sailed. But to come within the meaning of the rules as to closehauled vessels, it is not necessary that the vessel be sailed as near to the wind as she will lie, but only as near as she can be sailed, considering the vessel, the sea, and the wind, and makes the best progress to windward. A vessel has been held to be closehauled when sailing a half point free, and even when two points free, where the wind was baffling. But under ordinary circumstances a vessel is not closehauled where she has the wind two points free. A vessel hove to and making both headway and leeway is considered as closehauled, though she is alternately luffing up and falling off under the helm lashed hard down.

Where both vessels are closehauled on the same tack there is, of course, very little danger of collision, except in the case of overtaxing vessels, or where their courses converge owing to the ability of the one to lie nearer to the wind than the other, and in the latter case the vessel able to lie near to the wind must give way. In other cases the vessel to windward must give way. Where vessels closehauled on different tacks are approaching one another so as to involve risk of collision, the vessel on the port tack must keep out of the way of the one on the starboard tack, and the latter must hold her course. A vessel on the port tack must give way in time where the circumstances are such as to make it doubtful which vessel has the free wind. A vessel is not in fault for changing from the port to the starboard tack as against a vessel on the port tack where the change is made in ample time to enable the latter to avoid her. After a vessel has come about and filled away on another tack, she has the rights and obligations of a vessel on such tack, and must act accordingly.

A vessel which is running free must keep out of the way of a vessel which is closehauled, and the latter must hold her course. It is no excuse that the vessel sailing free mistook the course and position of the other and made a wrong maneuver. A vessel is said to be sailing free when she is not closehauled within the meaning of the sailing rules, whether the wind be forward or abaft the beam. Where both vessels are running free with the wind on the same side, the vessel which is to windward must keep out of the way of the vessel which is to leeward, and the latter must hold her course. Where both are running free with the wind on different sides, the vessel which has the wind on the port side must keep out of the way of the other, and the latter must hold her course. A vessel which has the wind aft must keep out of the way of other sail vessels. By wind aft is meant a wind at least four points abaft the beam.

When a vessel is beating and passing from tack to another, as a general rule she should tack and not wear unless she has good reasons therefore and sufficient sea room for the purpose. But a vessel must not without necessity go about so as to embarrass or damage other ships. Nor should she stand so close to the other before going about that, if she misses stays, a collision is inevitable. One vessel must anticipate the necessity of another going in stays, and must use diligence to avoid her when tacking and out of command. The approaching vessel has no right to speculate on the chances of the other coming completely about, getting under headway and avoiding her. If the vessel misses stays it is the duty of those on board to get her under command as soon as possible, and if on the port tack she ought to execute any practicable maneuver in order to get out of the way of the starboard tacked vessel.

(To Be Continued.)

RULES FOR SUCCESS.

In an address before eighty-three young mechanical engineers, the graduating class of Stevens' Institute of Technology at Hoboken, Paul Morton, formerly secretary of the navy and now president of the Equitable Life Assurance Society, gave the following as the code of success:

Hard work and common sense.

Willing application, no matter what the work may be.

Enthusiasm.

Work overtime whenever you can.

Take an animated interest in public affairs; you owe it to your country.

Be natural, so that you will be judged by your real value.

Avoid timidity. Many a man of ability has continued in the rut because he was too timid.

Aspire to do something which will benefit all mankind.

Be loyal to your employer. If you find that you cannot be loyal to him seek one to whom you can be loyal.

Cultivate self-control. It is necessary to success.

THE NAUTICAL MAGAZINE.

The MARINE REVIEW desires to announce the fact that it has taken over and will henceforth have the handling and sale of Clarence E. Long's *Nautical Magazine*. The *Nautical Magazine* needs no introduction to the majority of lake men, but to those who are not familiar with it, we will say this: The *Nautical Magazine* contains a complete course of lake navigation by self-instruction. It is very comprehensive and written in homely language, so that almost anyone should be able to grasp its meaning easily and readily. Its instructions are similar to the ones now appearing in the MARINE REVIEW. There is no better work printed for the lake sailor than this book. The *Nautical Magazine* has been endorsed by the best interests on the lakes, including many naval officers of repute. The course of instructions is better than that of any nautical school, simply because the book of instructions is complete, and follows from beginning to end, the one system. The work is entirely self-explanatory and is always with the student, whereas, on the other hand, when you are away from your teacher with no book of the instructions you have learned, you are unable to prove your work. Our course of instructions overcomes all such obstacles. The work is just as valuable to the student, or the man that knows, as it is to the novice. The *Nautical Magazine* is no longer printed, but we have secured the balance of them and are selling them for $5.00 per set complete. Capt. Wharry, our agent at the Sault, also has the handling of the work, so that any one desiring to see the volume before purchasing can do so from him.

A civil service examination will be held June 19-20 for the position of assistant inspector of hulls of steam vessels at Seattle. The examinations will be held in a number of cities. As the commission has experienced considerable difficulty in securing eligibles for the position of local and assistant inspector of hulls, qualified persons are urged to enter the examination.

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THE MARINE REVIEW

DEVOTED TO EVERYTHING AND EVERY INTEREST CONNECTED OR ASSOCIATED WITH MARINE MATTERS ON THE FACE OF THE EARTH.

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June 20, 1907

NECESSITY FOR INTELLIGENT STUDY.

In these days of keen competition in the navigation of steamships, there is the greatest necessity for intelligent study from the deckhand up, and from the master down. There is plenty of work on board for everybody, and each must do his work intelligently to give the best results. It is the duty of every master and mate to instruct those under them the proper method of doing their work in a seaman-like manner. Apprentices have to pick up, or to be taught, certain parts of their duty to be able to be of any use in the ship at all. A very little further explanation from time to time will enable them to appreciate the reason which lies at the root of the practice they follow, and both the ship and the apprentice will be better for the explanation, for every one does his work better from doing it intelligently. A clear understanding of his duty will make him, if he is of the class that gets on in the world, take such an interest in it that he will, when the time comes for his examinations, have little fear of the result. He will know the greater part of what is required of him for his first certificate from his practical experience, and the rest he can readily pick up from books. Nowadays every department of life has its handbooks for the self-instruction of those who are concerned with it. To this the sailor's profession is no exception, and there is no excuse for the candidate who incurs the sentence that he has learned up what is required of him "merely by rote," that is, by cramming the brain with things that are not clearly understood.

Merely going to sea does not make a navigator. It makes a seaman, whose duties are as widely different from that of navigator as daylight is from darkness. To be a first-class navigator one must first be a first-class seaman. Not a seaman of the old school but a modern seaman, or what might be termed a steamship seaman of today. Every young sailor before presenting himself for examination for his first papers ought to have a very good practical knowledge of the management of a steamer and the elements of navigation, and to have grasped some idea of the responsibilities of a master in other departments than those in which he is engaged in assisting him.

The old kind of seamanship was, and not so many years ago, the supreme art of the sea. But not any more, seamanship lost its old command by the advent of steam, and since then it is subordinate to the science of navigation.

IMPROVEMENTS NEEDED.

Now that azimuths have become such an important factor in lake navigation the United States lake survey should add a latitude and longitude scale to all their charts having subdivisions of one minute of arc instead of five minutes of arc. Such a scale is essential in more ways than one. In all azimuth work it is necessary to know the longitude to the nearest minute of arc. Knowing a ship's actual position her latitude and longitude can not be pricked off accurately on a lake survey chart on account of the inferior scale on these charts; inferior simply on account of the wide divisions, but that is all. A minute latitude scale would also afford a ready means of measuring off nautical miles in addition to the statute mile scale. Many boats are equipped with Walker's Cherub ship-log, which registers nautical miles instead of statute miles. Such a scale would also furnish ready method of converting nautical miles into statute miles, and vice versa. Another thing, it is often desirable to get the course and distance from the latitude and longitude of departure and destination. There are other points that might be mentioned that would favor the addition of these scales. We are almost positive that if the government authorities under whose jurisdiction this duty belongs will take the trouble of inquiring into it they will find that a large percentage of lake masters will favor the suggestions we have here made.

Another suggestion that would prove beneficial if carried out is this: Give the variation of the compass at the actual turning points for all important courses on the lakes instead of on shore. On shore, although in the vicinity of a turning point in a course, the variation may be affected by a certain element of local disturbance that would have no value 3 or 4 miles away. The course to be made good depends as much on the correct variation as the correct deviation and leeway. If the variation is incorrect the course will be incorrect by the same amount. The wonderful growth of lake navigation not only warrants but demands these improvements. The lake master has enough to occupy his mind without contending with this difficulty. Everything possible should be done for him in order that he be relieved of responsibilities that do not really belong to him. We make these suggestions merely from a sense of duty, our aim being to elevate the already high standard of excellence found in the charts of the lake survey. The changes

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BLOCKADE AT LIME KILNS.

Matters have been in a somewhat critical state at the Lime Kiln Crossing during the past several days. The eastern channel near the mouth of the Detroit river was completely blocked by the barge Montezuma upbound in tow of the steamer Rappahannock, running hard aground on the east bank. The stern of the vessel swung across the channel, closing the passage to shipping. To add to this calamity, the steamer Sonoma ran ashore on the west side of the west channel just north of the Lime Kilns, striking the lightship and setting it adrift. Fortunately the steamer went on parallel with the shore with its stern projecting but slightly into the channel. If her stern had swung across as did the Montezuma's, navigation between the upper and lower lakes would have been completely blocked. As it was, a patrol had to be established enforcing the rule that all upbound boats should wait below the crossing until all downbound boats had passed. The lighter Newman was set to work at once upon the Sonoma, to lighter her cargo of ore. She was released Wednesday.

FREIGHT SITUATION.

No unusual features have marked lake trade during the past week. Vessels are getting good dispatch in port, though their movement in the open lake has been delayed somewhat by fog during the past few days. Dispatch, however, cannot be in any sense complained of. It is quite likely that the ore movement during June will break all records for any one month. Coal, too, is moving forward freely, with premiums being paid to smaller ports. These two trades are practically taking all tonnage that is offered, so that the grain rate has been marked up a bit in order to attract tonnage.

FREIGHTERS FOR 1908.

Mr. G. A. Tomlinson of Duluth has given contract to the Great Lakes Engineering Works for two freighters for 1908 delivery. The vessels will be duplicates and will be 564 ft. over all, 544 ft. keel, 58 ft. beam and 32 ft. deep. Their engines will be triple expansion with cylinders 24, 37 and 65 in. diameters by 42 in. stroke. Steam will be supplied by two Scotch boilers, 16 ft. in diameter and 12 ft. long, allowed 170 lbs. pressure. The new steamers will be operated by the Mutual Steamship Co. which has been incorporated at St. Paul, Minn., for that purpose.

LEATHER BOUND RED BOOKS.

The MARINE REVIEW has in stock twenty copies of the Great Lakes Red Book, beautifully bound in leather and edged with gold leaf. The books make an extremely appropriate gift from a business house to its customers. The lot will be sold for $20 flat and the first order received in this office gets them.

PERSONAL.

Joseph Ripley has resigned his position as one of the consulting engineers of the Panama Canal Commission. Mr. Ripley was for many years in charge of the canal at Sault Ste. Marie, and his appointment as consulting engineer of the Panama canal was made with especial reference to his knowledge of the design of locks.

SHORTAGES OF CANADIAN GRAIN.

The following letter, published in the *Buffalo Commercial*, is of interest:

The letter which you quoted yesterday from the MARINE REVIEW of 13th inst., referring to recent shortages of 1,986 bu. oats and 3,738 bu. wheat, on five vessels from Fort William and Port Arthur, covers one point only.

The large elevators at loading ports have a number of scales on the weighing floor near the top of the house. Under each scale hopper is a short spout to connect with one of a nest of long spouts to carry grain to various parts of the elevator, or to a shipping bin. In some houses the shipping bins are double—one back of the other—with an opening to the outer one.

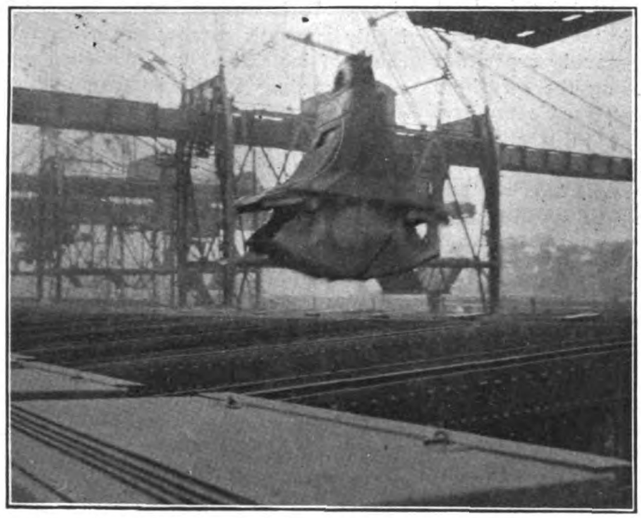
Each scale hopper has a slide bottom, by which grain can, by a little carelessness, be cut off in the hopper and again weighed as part of a new draft. A spout misplaced on the floor below the weighman can send the grain to the wrong bin. a spout may wear through, or, if it has cut off gates for different bins, grain may leak into other bins. Where there are double shipping bins the opening to the outer one may become clogged, preventing the passage of grain to the boat.

In spouting grain to shipping bins it may overflow into another bin—the vessel losing it. And it can be left in the shipping bin by a little carelessness, as the MARINE REVIEW letter says, and another may get it.

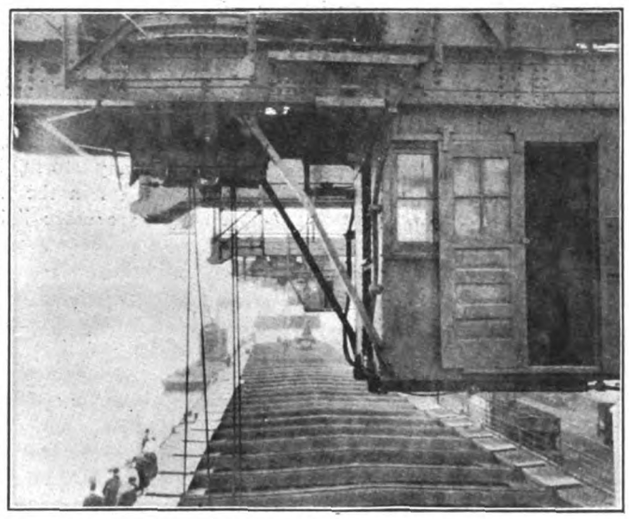
All these things can occur, and all of them have occurred. What happens in loading the five cargoes I do not know. We still hope to find the cause.

JUNIUS S. SMITH.

Lake Weighmaster, Corn Exchange, of the Chamber of Commerce.



LOADED BUCKET CLEARING THE HATCHES.



SHOWING OPERATOR'S CARRIAGE, THE BUCKET HAVING DESCENDED INTO THE HOLD.

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NON-REVERSE COURSES AGAIN.

Editor MARINE REVIEW:—In recent issues of the MARINE REVIEW the question of "Non-Reverse Courses" on the great lakes has been pretty thoroughly discussed pro and con; and it has been revealed that the men who command vessels of the active fleet are almost unanimous in the opinion that such a rule would increase, rather than lessen, the danger of collision, and that the loss by stranding and storm would be greatly augmented by its adoption. The letters published in the issue of May 16 are a credit to the writers and in the opinion of those practically conversant with the subject, establish beyond a doubt the inconsistency of such a rule. It is an old observation "that the man who wears a tight shoe is about as well qualified as any one to point out where it pinches."

Never in the history of the great lakes were masters and mates more alert to the duties of their profession; they study the principles of navigation and apply them as far as the conditions will admit; they are perfectly familiar with the bearing indicator and make use of it at every available point when weather will permit. In short, the maritime interests of the world cannot produce better navigators, pilots, or seamen than are today handling the vast and valuable tonnage that is plying between ports of the great lakes. The lake seaman becomes a navigator under the most favorable environments for learning practical methods and self-reliance. It is a well known fact that fully one-half the accidents recorded can be traced to "mushroom" pilots who have not had a practical training in the methods of lake navigation.

On page 157 of Patterson's Nautical Dictionary may be found a chart portraying currents in the Atlantic ocean. It is recorded that when Sir Henry Hudson, an English navigator in command of a Dutch ship, sailed westward in search of a northwest passage, he encountered and followed an ocean current (expecting to find the passage), until he discovered the bay of New York and the river that bears his name. Again, while homeward bound, another current, further south, aided his progress on the course to the English channel. The early Spanish explorers discovered that by making a westward course via the Canary islands, they were favored by a current setting across the ocean to the West Indies, and by laying the return course north of the Sargasso sea, were aided by the southern portion of the gulf stream, flowing east. Thus it is that ocean currents and navigators in centuries past are responsible for the establishment of non-reverse courses on the Atlantic. It is quite natural for trans-Atlantic steamship lines to adopt the old custom to avoid the danger of collision and use it also for advertising purposes.

As stated, the subject of non-reverse courses on the great lakes has been pretty thoroughly discussed and the difficulty in establishing such a rule very clearly pointed out, particularly in regard to the older and smaller classes of vessels with reference to the weather conditions, also the danger of collision at points where courses cross and intersect. It has been admitted that the large modern steamers would experience no hardship in making the off shore course; but it is not good reasoning. While they are able to weather almost any storm, if properly handled, put them in the troughs of a sea and they are more liable to accident than the smaller vessel under the same conditions. Therefore, in a heavy sea an experienced master would keep his ship head to, running before or pull for a weather shore, regardless of courses. Some one, with more enthusiasm for the cause than good judgment, has pointed out that by scientific navigation the long off-shore courses can be made in a fog with perfect safety. Suppose a modern steel steamer laden with iron ore leaves Two Harbors. It is clear and with the pelorus her navigator applies the azimuth, ascertains the compass error and lays his course offshore on purely scientific principles. An hour later heavy fog sets in and is continuous during the entire run on Lake Superior. Yet, at a point 29 miles SE¼E from Passage Island light house, he is to lay a course that will take the vessel to a point six miles north of Whitefish Point, and from thence, another course to Parisian Island, fetching between the island and "the course of vessels bound up Whitefish Bay."

It is only necessary to point out a few of the obstacles to such navigation of which experienced masters are familiar to prove that the idea is not practical. The modern lake steamer, loaded or in ballast, is a long flat-bottom craft of heavy tonnage and small power, approximately developing about 1 H. P. to eight tons burden. When running on the wind, or in cross currents, she is, therefore, very susceptible to drift, the amount of which could not be accurately determined in a fog on the offshore course. At Two Harbors, or any other port along the northwest shore of Lake Superior, a course may be laid on scientific principles; the exact error of the compass ascertained, and proper allowance made. When the ship has run a few miles out in the lake, further away from the shore, the error is quite liable to change. In a dense fog on the offshore course there would be no way of ascertaining the change or making any correction.

Change of error in the compass of a steel ship laden with iron ore or steel, is not confined to or caused entirely by disturbing elements on shore or beneath the surface of the water. It is a well known fact that highly magnetic cargoes are often the cause of increasing or diminishing error, according to the heading of the ship, and under certain conditions the change does not take place until several hours after the cargo has been received. This disturbing element has been known to exist and affect the compass for hours after the cargo had been discharged and with the ship many miles from the port of discharge.

ERVAS.

MR. C. L. BARRON.

C. L. Barron, 267 Fourteenth Ave., Detroit, who was chief engineer last year of the steamer Huron, formerly the Darius Cole, retired from active service last fall. Mr. Barron's life has been spent on the lakes. He was born at Newport, Mich., now Marine City, and entered the machine shop of Eber B. Ward at that place at the age of twenty years. He began his life as a sailor on the steamer Huron in 1856, then running in Ward's Line between Detroit and Saginaw, acting as second engineer. In 1859 the company put him in charge of the machinery of the steamer Samuel Ward and he remained in this line a number of years. He later had charge of Capt. Darius Cole's boats, the Alpena and Green Bay City, plying between Bay City and Alpena. For a period of ten years he was in the employ of John P. Clark as chief engineer on the steamer Pearl, which ran between Cleveland and Put-in-Bay. He served on the steamer City of Milwaukee in Lake Michigan for twenty years. In the spring of 1905 he ran the Darius Cole out of Buffalo. In 1906 she was rebuilt and her name changed to Huron and put on the route between Cleveland and Sault Ste. Marie. In the fall, chiefly owing to trouble with firemen, he concluded that his sailing days were

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over and retired, thus ending his career as he had begun it—on a vessel named Huron.

QUESTIONS FOR WHEELSMEN AND WATCHMEN.

FIFTH INSTALLMENT.

49. How should sidelights be fitted?

50. What are the course lights?

51. Why are the colored lights fitted with inboard screens?

52. Over how many points of the horizon should both the colored or sidelights show together?

53. Describe the headlight on a steam vessel and tell how it should be fitted?

54. What lights should a steamer with a tow, other than a raft, exhibit?

55. What lights must a vessel in tow of another vessel exhibit?

56. When is a vessel considered a steam vessel and when is she considered a sailing vessel?

57. If a vessel is being propelled by both sails and machinery is she a steam or sailing vessel?

58. What is the forward tow light for steamers with a vessel or barge in tow?

59. What is the after tow light for the same? What is this after light called, what is it for, and how should it be fitted?

60. What do you understand by an overtaking vessel?

ANSWERS TO QUESTIONS FOR WHEELSMEN AND WATCHMEN.

SECOND INSTALLMENT. PUBLISHED MAY 30.

13. Because it lies half way between N and NE. It takes the name of the nearest cardinal point and the adjacent inter-cardinal point. North is the nearest cardinal point, hence, the first part of the name is composed of north; and NE is the adjacent inter-cardinal point, and therefore, northeast is the remainder of the name, or when both together, north-northeast. That is in the direction of north toward NE, or between north and NE.

14. It is the vertical black line marked on the inner surface of the compass bowl, and represents the vessel's head and the line of the keel. It is to steer the ship by, that is, to keep her on any desired course. It is point faced by the steersman, consequently it is on the forward inside surface of the bowl. The center of the compass card and the lubber's point should be in the same line with the keel of the ship, or parallel thereto, and the point marked on the card representing the course the vessel is to be steered should be kept coincident, that is, the vessel's course and lubber point should always coincide. The point of the compass card which is directly against the lubber mark indicates the direction of the ship's head by that particular compass. Nearly all compasses now have four lubber marks, but only one is used to steer by; the others are more for "lining up" by, and for bearings abeam, and such other purposes.

15. Eight points—4 points to E and from E to SE 4 points.

16. W ½ S. Reverse is simply to return on the same line, course or bearing, that you have either gone or observed on.

17. N x W. Five points to the left of the wind for the starboard tack.

18. By the trim of her sails, the direction of the wind and the course the vessel is heading on.

19. By noting the number of the blasts of her fog horn.

20. One blast at intervals of not more than one minute, but as often as it may be deemed prudent, so long as the intervals between each set of blasts can be readily distinguished from each other.

21. Forward of abeam is the bearing or direction that makes an angle on the forward side of a line running exactly crosswise of the ship, that is, at right angles with the keel line of the ship. Abeam is this crosswise line, and is always 8 points from the line of the ship's head and stern, or keel line proper. Abeam is a line at precisely right angles to the keel, no matter where it may be on the ship. For example: Imagine a fore-and-aft line drawn from stem to stern on deck, and then another drawn at right angles to it, that is, crosswise. Now, any bearing that makes an angle with this athwartship line on the forward side of it (toward the bow) is said to be a bearing "forward of abeam." And any bearing that comes abaft this line is said to bear "abaft the beam," that is, on the after side of it, or toward the stern.

22. Two points forward of the starboard beam, or six points from the ship's head.

23. ESE. Abreast is always 8 points from the direction of the ship's head, hence, 8 points to the right (starboard) of NNE is ESE. Abreast and abeam are one and the same thing.

24. N x E½E. For the port tack count 5½ points to the right of the direction of the wind, hence, 5½ points to the right of NW is N x E½E.

The steamer Bulgaria grounded on South Fox Island in a dense fog, but was released by the car ferry Manistique without injury.

THE VALUE OF A COURSE CORRECTOR.

When bearings are frequently taken by compass, as on entering port, their ready conversion into true or correct magnetic equivalents for plotting on the chart is a matter of the first importance; and it is in such cases that the course corrector is most useful; many things then engage the navigator's attention—he is liable to err, however capable and careful, but the mechanism—never. Let any one propose to himself quickly a problem like the following—ship's head by compass SE½S, deviation 8° Wly., variation 6° Wly., what are the true and correct magnetic bearings corresponding to ENE and S x W½W?—and he will realize the facility of the mechanical over the mental process, with the unfailing correctness of the former, in addition.

When one becomes accustomed to using a course corrector he will never use anything else. The superior qualifications of our course corrector lies in the fatc that everything that is done is right before the eyes of the operator. Nothing is done without showing the reason for it, because the operator must plainly see every move he makes. He cannot help it for the whole thing is right before him.

DRY DOCK AT PUGET SOUND.

The navy department has advertised for bids for the construction of a large basin dry dock for the Puget Sound navy yard which is to cost not to exceed $2,250,000, and for which the bids are to be opened June 27. The dry dock will embody a new feature in its construction in that it will be made head-square instead of round, this design being employed for the purpose of enlarging the dock as the occasion may require with comparatively small cost. It is expected that if the plan proves a success it will be employed hereafter on all government dry docks. The dimensions of the new dry dock are to be as follows: Length on center line at coping level from outside at head to end of apron, 727 ft.; length on floor from head to outer sill, 653 ft.; length on floor from head to abutment, 608 ft.; width in body of dock at coping (least), 135 ft.; width between faces of altars at still level (least), 95 ft.; width between faces of lowest altars (least), 82 ft.; width of entrance at coping level, 115 ft. 6 in.; depth on center line coping to floor of dock (greatest), 47 ft. 7 in.; depth of center line coping to floor of dock (least), 46 ft. 7 in.; depth of coping level to sill of dock, 45 ft.

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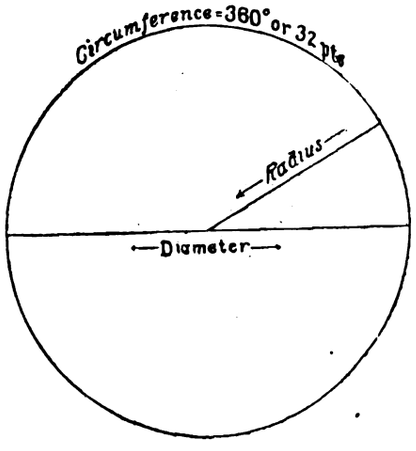
SCIENTIFIC LAKE NAVIGATION

BY CLARENCE E. LONG

THE DEGREE IN ALL ITS PHASES.

The degree is the 360th part of the circumference of a circle. The value of a degree is 60 minutes. A degree of latitude is equal to 60 nautical miles, anywhere from the equator to the poles; but a degree of longitude is equal to 60 miles only on the equator —a geographical mile. Leaving the

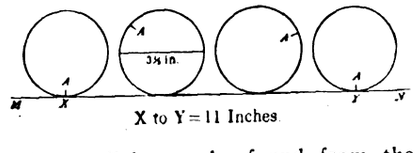


equator, the distance between the meridians constantly contracts, so that at the poles there is no such thing as longitude, all the meridians meeting at these points.

The above table gives the length of a degree in both latitude and longitude at each parallel of latitude on the earth's surface.

The length of a degree of latitude is not precisely equal to 60 nautical miles everywhere, as will be seen by the table, but it is so near that for all practical purposes it may be reckoned as such.

The length of a degree of latitude between any two meridians on a cer-



X to Y = 11 Inches

tain parallel may be found from the Hypotenuse, Perpendicular and Base Tables (known in navigation as the Traverse tables), by simply finding the parallel marked at the top (turn the angle into degrees), then opposite the figure 60 in the Hypo. column will be found (to the right) in the Perp. column the number of nautical miles between the meridians. The difference of latitude and departure (Useful Tables, Table 2) will give you the same thing.

Since the meridians are all parallel to the equator and meet at the poles, the distance between any two meridians, measured east and west, is less as the latter is greater—that is, the absolute number of miles, or of feet, in a degree of longitude, as the latitude in which they are measured are greater.

Ex. On the parallel of 45 degrees the distance between the meridians is 42½ nautical miles; consequently, if the ship started from the meridian or longitude of 86 degrees west and sailed 42½ miles due west on the parallel of 45 degrees, she would reach the meridian or longitude of 87 degrees. This position is on Lake Michigan, from South Manitou Island to the west shore, near Baileys Harbor. Anywhere on the equator a degree of longitude is 60 miles, and to go from 86 degrees to 87 degrees the distance traversed would be 60 miles.

LENGTH OF A DEGREE OF LATITUDE AND LONGITUDE.

Lat. °	Degree of Longitude Stat. Miles	Naut. Miles	Degree of Latitude Stat. Miles	Naut. Miles
0	69.160	60.000	68.698	59.600
1	.150	59.991	.698	.600
2	.119	.964	.699	.601
3	.066	.919	.700	.602
4	68.992	.855	.702	.603
5	.898	.773	.704	.605
6	.783	.673	.706	.607
7	.647	.555	.709	.609
8	.491	.419	.712	.612
9	.314	.265	.715	.615
10	.116	.093	.719	.618
11	67.898	58.904	68.723	59.621
12	.659	.697	.728	.625
13	.400	.472	.733	.629
14	.120	.229	.738	.634
15	66.820	57.968	.744	.639
16	.499	.690	.750	.645
17	.158	.094	.757	.651
18	65.797	.081	.764	.657
19	.416	56.751	.771	.663
20	.015	.404	.779	.669
21	64.594	.039	68.787	59.676
22	.154	55.657	.795	.683
23	63.695	.258	.804	.691
24	.216	54.843	.818	.699
25	62.718	.411	.822	.707
26	.201	53.962	.831	.715
27	61.665	.497	.840	.723
28	.110	.016	.850	.731
29	60.536	52.518	.860	.740
30	59.944	.005	.870	.749
31	.334	51.476	68.881	59.758
32	58.706	50.931	.892	.767
33	.060	.370	.903	.776
34	57.396	49.794	.914	.786
35	56.715	.203	.925	.796
36	.016	48.597	.936	.806
37	55.300	47.976	.947	.816
38	54.568	.340	.959	.826
39	53.819	46.690	.971	.836
40	.053	.026	.983	.846
41	52.271	45.348	68.995	59.856
42	51.473	44.656	69.007	.866
43	50.659	43.950	.019	.877
44	49.830	.231	.031	.888
45	48.986	42.498	69.044	59.899
46	.126	41.752	.056	.910
47	47.251	40.933	.068	.920
48	46.362	.222	.080	.931
49	45.459	39.439	.092	.941
50	44.542	38.643	.104	.951
51	43.611	37.835	.116	.962
52	42.667	.016	.128	.972
53	41.710	36.186	.140	.982
54	40.740	35.344	.151	.992
55	39.758	34.491	.162	60.002
56	38.763	33.628	69.173	.012
57	37.756	32.755	.184	.022
58	36.737	31.872	.195	.032
59	35.707	30.979	.206	.041
60	34.666	30.076	.217	.050
61	33.615	29.164	.228	.059
62	32.553	28.242	.238	.068
63	31.481	27.311	.248	.077
64	30.399	26.372	.258	.086
65	29.308	25.425	.268	.094
66	28.208	24.471	69.277	.102
67	27.100	23.509	.286	.110
68	25.983	22.540	.294	.117
69	24.857	21.564	.302	.124
70	23.726	20.582	.310	.131
71	22.582	19.593	.318	.137
72	21.435	18.598	.326	.143
73	20.282	17.597	.333	.149
74	19.122	16.590	.339	.155
75	17.956	15.578	.345	.161
76	16.784	14.561	69.351	.166
77	15.607	13.539	.357	.171
78	14.425	12.513	.362	.175
79	13.238	11.484	.367	.179
80	12.047	10.452	.371	.183
81	10.853	9.417	.375	.186
82	9.656	8.379	.378	.189
83	8.456	7.338	.381	.192
84	7.253	6.294	.384	.194
85	6.048	5.248	.387	.196
86	4.841	4.200	69.389	.198
87	3.632	3.151	.390	.199
88	2.422	2.101	.391	.200
89	1.211	1.050	.392	.201

THE CIRCLE.

A circle is a plane figure whose boundary is at all points equally distant from the center.

The curved line that forms the boundary is called the circumference.

The diameter is any straight line drawn from one point of the circumference to another and passing through the center.

The radius is any straight line drawn from the center to the circumference.

Cut out of cardboard a circle whose diameter measures 3½ inches. Mark a point A on the circumference, and roll the circle on a plane surface along the line MN. Make a mark at X where the point A touches the line at the beginning of its revolution, and at Y where A touches the line at the end. Measure the distance XY, which is the length of the circumference of the circle.

If the distance between X and Y is 11 inches, what is the ratio of the diameter of a circle to the circumference.

3½ = 7-2 × 1-11 = 7-22, which equals a little more than 1-3.

The ratio between the circumference

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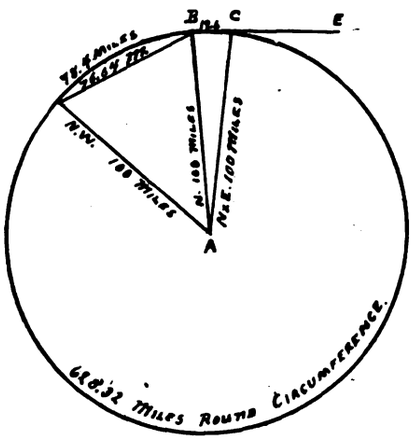
of a circle and the diameter has been ascertained to be 3.1416.

Multiply the diameter of a circle by the mixed number 3.1416.

It has been found that the circumference of every circle equals its diameter multiplied by 3.1416 nearly.

Example—A wheel with a diameter



A = starting point.
B = Point of arrival after steaming North 100 miles from A.
C = Point of arrival after steaming N by E 100 miles from A.
B C = 19.6 miles, distance apart after each steaming 100 miles; from B to C is practically a straight line (any small arc of a great circle is practically a straight line).
A B and A C also represent the radius of a circle whose diameter is 200 miles, and whose circumference is 628.32 miles.
A B represents a vessel having steamed North for 100 miles.
A D represents a vessel having steamed NW for 100 miles.
76.54 miles represents the distance the two vessels would be apart on the straight line, and 78.4 miles represents the distance they would be apart by the circumference method, which is equal to 4 times the distance for one point.
C E is a tangent.

of 3 feet has how many feet in its circumference?

3.1416
3 ft.

Ans. 9.4248 ft. or 9 and nearly ½ feet.

Remember the rule and the mixed number 3.1416.

THE DISTANCE APART.

Ex.—Two boats start from the same point, one steers due north 100 miles and the other due N by E 100 miles; how far apart will they be after each having run this distance?

Now, this example is worked on the same principle of finding the circumference of a circle. You know a circle and 32 points or 360 degrees, is all the same thing, and the rule, multiply the diameter by 3.1416 and divide by 32. If the diameter is expressed in feet the circumference will be in feet, and if in miles the circumference will be in miles; nautical or statute miles, which ever you use, it makes no difference.

Now, in the example 100 miles represents the radius of the circle whose circumference we wish to determine; so we double up on the radius (2 radii equal a diameter) and multiply it by 3.1416 and divide by 32, as the angle from north to N by E is 1-32 of a circle, or of the compass, thus,

3.1416
200 diameter

Points 32)628.3200(19.6350 number of miles apart on one point.
32
308
288
203
192
112
96
160
160

628.32 is the number of miles round the circumference of a circle whose diameter is 200 miles, or radius is 100 miles.

In an example of this kind just cut off all the decimal places to tenths, which is close enough, as 19.6 miles apart on the point in a hundred. This is often called 20 miles on a point, but 19.6 is the exact distance. This theory is mathematically correct for one point, but you cannot work it for over one point. It is on the principle that any short distance on the arc of a great circle is practically a straight line, see diagram.

Note.—You cannot double up on the distance that you find for one point to determine what it is on two, three, four, or any other number of points. Bear this in mind.

By this circumference method we get the distance on the arc of the circle, and when the angle, or course, is more than one point, this method makes the distance too great, as you will readily see by the diagram. You will know how to get the distance for more than a point when you are more advanced.

You can prove an example of this kind by projecting (laying down) the courses on a chart, and then measuring the distance straight across from one end of the course to the other.

Remember, that this works the same for ¼, ½, ¾, or any other fractional part of a point, by dividing by what you found for one point.

For example: Supposing that you steered ¼ of a point outside of the course between Chicago and Pt. Betsey, a distance of 203 miles, how far off your course would you be after running this distance? The mathematical formula being thus:

203 multiplied by 2 multiplied by 3.1416 divided by 32 and this quotient divided by 4, equals 9.9 miles. Work this example out.

Here is another way of doing it. Multiply the distance run by .196, as 203 times .196. Here is another way of getting it, but it is only approximate. Multiply the distance run by the decimal .2. This always makes the distance a trifle too much. These factors are just good for one point, remember. How far would you be off on a 40 mile run on one point. 40 multiplied by .2 equals 8.0 miles off and so on. 40 multiplied by .196 gives a product of 7.8 miles, which is correct. The .2 method is a good thing to know and remember, for you can figure it mentally, and in talking with any one on this subject you can calculate these different distances in your head, and for a person that isn't familiar with the method he will do a good deal of wondering how you figured it so quickly.

Here is another example on the same principle, that the inspector gives: You are going up the west shore of Lake Michigan, and when you pick up the lighthouse on Twin River Pt. you are heading right on to it, and by a cross-bearing (to be explained) of the lighthouse and another object on shore you find that you are just 10 miles from the lighthouse, how much would you have to alter youn course to pass two miles outside of the light? Answer, one point, found thus:

10 times 2 times 3.1416 divided by 32 equals 1.96 miles.

One point on a distance of 10 miles will make just 1.96 miles, which is near enough to call 2 miles. Work this example out.

ANOTHER METHOD OF WORKING IT.

Here is another method of working this problem:

Multiply the number of degrees by the decimal .01745, and the product by the radius. This will give the length of the arc. An arc, you know, is any part of a circumference.

Thus, in the above example of two boats steering a point (11 degrees 15 minutes) difference for 100 miles. 100 miles represents the radius of the circle. The arc is 11 degrees 15 minutes; thus,

.01745
11.25° = 11° 15′
8725
3490
1745
1745
.1963125
100

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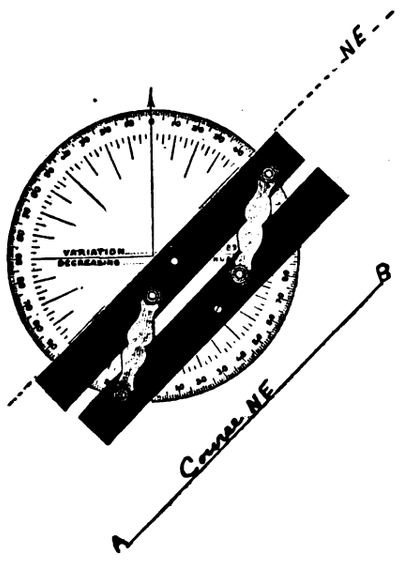
19.6312500, or 19.6 miles apart.

Supposing that two boats steered 8 degrees difference in the course for a distance of 165 miles; how far apart would they be after each having run this distance?



Parallel Ruler and Chart Compass Diagram, showing the manner in which the ruler transfers the direction in obtaining the course or bearing. A B is the line to be transferred. The beveled edge of the ruler is made to align with the line A B; then the ruler is made to slide up to the center of the compass diagram, as in illustration.

0.1745
8

.13960
165

69800
83760
13960

23.03400 miles apart.

TO FIND THE DIAMETER OF A CIRCLE, THE CIRCUMFERENCE BEING GIVEN.

Rule—Divide the circumference by 3.1416, the quotient is the diameter.

What is the diameter of a circle whose circumference is 628.32 miles.

3.1416)628.3200(200 miles diameter.
62832

00

What is the diameter of a tree whose girt is 18 ft. 6 in.? Ans. 5 ft. 10.67 inches.

Find the diameter of a wheel whose circumference is 50 ft. Ans. 15 ft. 10.98 in.

What is the radius of a circle whose circumference is 31.416 ft.? Ans. 5 ft.

Find the circumference of the greatest circle that can be drawn with a string 14 inches long, used as a radius. Ans. 7 ft. 3.96 in.

The diameter of a bicycle wheel is 28 inches. How far does a bicycle go during 10 revolutions of the wheel? Ans. 72.47 ft.

THE PARALLEL RULER AND ITS USE.

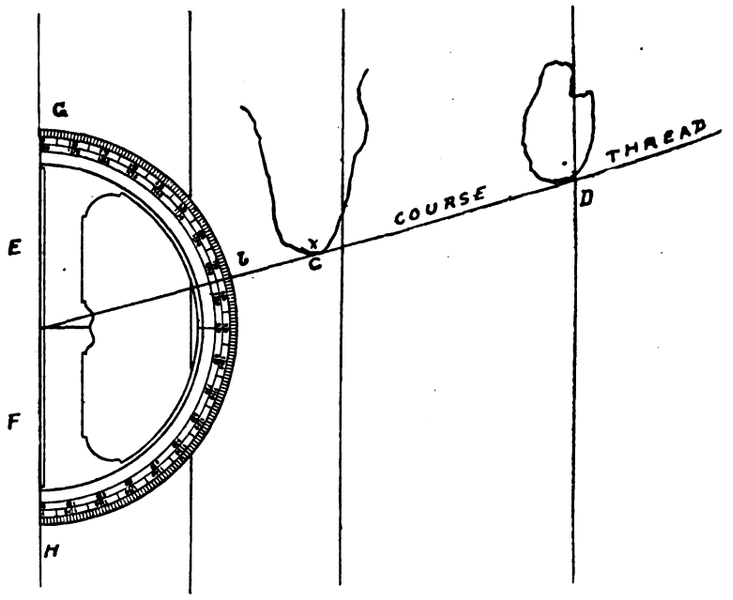
The parallel ruler is an instrument that every seaman is familiar with. It is usually made of ebony or gutta-percha, and consists of two flat rulers (usually 18 inches long) connected by pivoted cross-hinges of brass of equal length, and so attached by these hinge joints that the rulers may be made to recede from or approach towards each other at pleasure, so that if one remains fast the other will constantly be parallel to it. The parallel ruler is really a draughtsman's instrument for drawing parallel lines.

COMMON PARALLEL RULER.

In chart work the parallel ruler is employed to transfer the direction of a bearing or course to the nearest compass rose, or diagram on the chart, whereby to ascertain its name and direction. To lay off a course with them place the beveled edge of the ruler over the ship's place, or the point of departure, and the place or point bound to; then preserving the angle slide the beveled edge to the nearest compass rose printed on the chart until it lies exactly over the center of the compass; now read the compass point or degree, looking toward the place sought, and that will be the required course; the true course if read on the outside rose, the correct magnetic course if read from the inside compass.

There is a small brass knob, or thumb piece, in the center of each rule, which is to be held in the fingers when manipulating the instrument, i e., in sliding or climbing off the angle of the course or bearing to the nearest compass rose for reading. The student will find this troublesome work the first few times that he attempts to do it and unless he is careful the ruler will slip and slide about the chart in a provoking manner, and the angle thus run off will be out of all parallelism with the line or points started from. This trouble usually comes from bearing down too hard on both rulers, thus producing friction and causing an irregularity of movement. By observing the following simple and practical hints troubles of this kind can easily be averted:

After placing the ruler (closed) over the points or places to be protracted place the first three fingers of the left hand on or about the center of the lower ruler, which will be the one next to you, and with the little brass knob between the first two fingers, bear down lightly, or just enough to hold it in place and keep it from slipping; then with the knob on the upper ruler lightly touching between the thumb and first finger of the right hand (do not bear down) slide this ruler away from you easily and smoothly; do not jerk it, but push it along freely and easily. When you have shoved it as far as it will go (the hinges at right angles to the rulers) bear down on this one with the right hand, and move the other in the same manner with the left hand, and so on till you reach the compass diagram, or



In the Diagram, EF is the zero line of the Protractor, laid exactly over GH, a meridian line on the chart; CD, two positions on the chart between which it is required to know the course; the line from the center of the protractor through CD represents the thread. The true course (N 75° E) will be found at J, where the margin of the protractor is cut by the thread.

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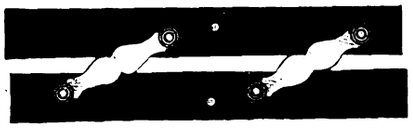
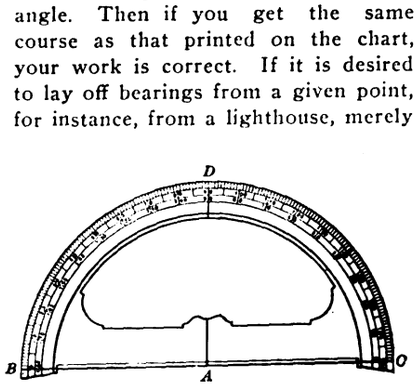
such other place or point sought on the chart. Do not bear down on both rulers at the same time. Bear down as much as you like on the ruler that is to remain stationary, but the one that is to be worked wants to move freely. Be sure to have a smooth surface to work on, or no amount of care and skill can prevent slipping. Do not attempt to move or slide both rulers at the same time; always hold one ruler while you slide the other. By paying attention to the foregoing instructions the beginner will prevent slipping and trying back, as well as a whole lot of unnecessary work.



PARALLEL RULE.

There are a great many captains sailing boats that do not like the parallel ruler for taking off the course, and prefer the compass card and string, or course protractor, instead. When one has become accustomed to its use there is nothing more handy and convenient than the parallel ruler.

A good practice for the beginner, and one that will prove his work, is to take a chart with the courses and their directions printed on them; then lay the ruler along the line or course, so laid down, and run it off to the nearest compass rose and read the angle. Then if you get the same course as that printed on the chart, your work is correct. If it is desired to lay off bearings from a given point, for instance, from a lighthouse, merely

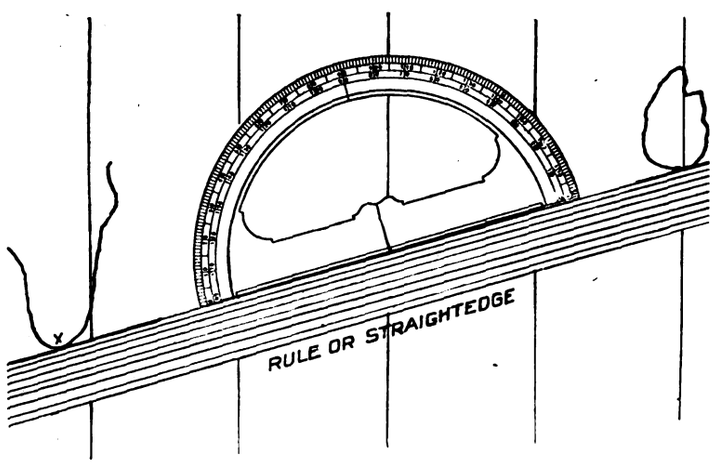


SEMICIRCULAR PROTRACTOR

place the ruler over the nearest compass diagram according to the course required, and preserving parallelism, work the rulers to a point directly over the object you desire, or have taken the bearings of, and draw a pencil line through it. For an example, supposing that you desired to lay the bearing W by S from Pt. Betsey lighthouse. Place the ruler over the center of the nearest compass rose (W by S and E by N) and transfer this direction with the parallel ruler to a point directly over the lighthouse marked on the chart and draw a line from or through it to represent the bearing.

Another good practice for the beginner is to note some course laid down on the chart. Lay the parallel ruler over this course on the nearest compass diagram then run this direction with the parallel ruler to the course as laid down. The edge of ruler when carried to it should exactly coincide therewith; if not, the ruler has slipped on you, and you must try over.

The parallel ruler is hinged so that it will work or carry to the right, that is, in working it it progresses to the right. Then to make it fetch to the left, hold the upper rule, and slide the lower rule down (toward you) and up again to the left as far as it will go; then slide the upper rule to the left, thus the instrument has gained surface to the left. It often happens in laying some courses on a chart you will work away from the compass rose if this is not done. A little practice with the instrument on a chart will make this very plain.



In purchasing a parallel ruler see that the beveled edge is straight, and no crooks or humps in it. To test this lay its edge on a flat surface and see if the whole length of the rule touches. If it does, all right. When the ruler is closed see if the two rulers come exactly together and are in contact all along. To do this hold the ruler (edge up) up to the light and see if you can see through the crack. See that the hinge joints do not bind, and that the ruler works as freely from you as it does toward you. To remedy binding merely start the rivets holding the hinges to the ruler. Get a ruler at least 18 inches in length.

In case the distance between two places on the chart is too great to be reached by the parallel ruler, take a piece of string and stretch it from point to point by sticking pins in the chart through the two places; then lay the beveled edge of the ruler against the string to obtain the angle, and proceed as before explained. A yard stick (about an inch wide and a quarter inch thick) is handy for this purpose. Place the stick between the two places, then place the beveled edge of the parallel ruler against its edge, remove the stick and slide the parallel ruler to the nearest compass diagram and read the angle. In case there is no parallel ruler at hand, or it having become broken or lost, you can get the course near enough with the yard stick, or any ordinary rule, and the dividers. Line your stick up between the two places you desire the course for, then with the dividers opened place one leg in the center of the nearest compass rose and stretch the other to meet the edge of the stick or rule; take the jointed part of the dividers between the thumb and forefinger of the right hand and draw it along the edge of the stick, keeping it as near right angles thereto as possible. Where the outside leg of the divider passes through the circumference of the chart compass read the angle, which is the course between the two places.

THE ROLLING PARALLEL RULER.

In practice there is nothing neater or handier than the Graduated Rolling Parallel Ruler. On shore this has been in use fon many years, but it is only of late years that it has found its way on board ship. This instrument will be found on some of the fine yachts of the lakes, and it may be said of all the means for determining courses or laying off bearings this is about the quickest. Since only the rollers touch, it has the further advantage of not soiling the chart so much as the jointed ruler, which is in contact over its whole surface. To work truly, the

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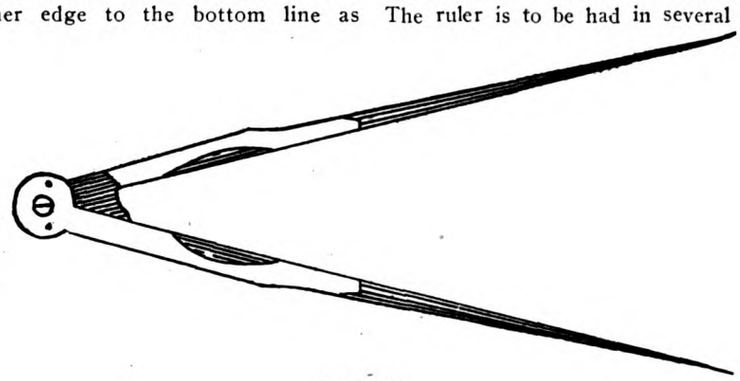
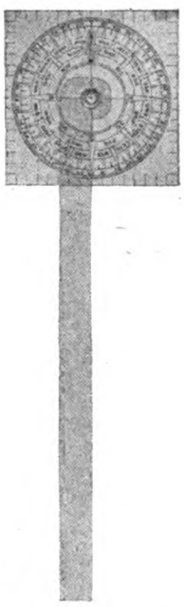
rollers must be exactly of the same diameter; this is easily tested before purchase. Carefully set the further edge of the ruler to the bottom marginal line of a chart; run the ruler nearly up to the top, and draw a fine pencil line along both edges. Now shift the ruler end for end, set the further edge to the bottom line as carefully as before, and roll up within an eighth of an inch or so of the top pencil line. Draw two more pencil lines along top and bottom edges respectively, and the thing is done. The eye will decide in a moment if the upper pair of lines are parallel, as they should be; if so, then the rollers are equal. Then examine the lower pair of lines; if parallel, then the two edges of the ruler are parallel, as they should be. Of course, the chart or paper must be laid on a flat surface. One of its edges is divided into degrees, similar to an ordinary protractor; the opposite edge is also graduated, but the divisions are half and quarter points. The advantage derived from this instrument is, that by laying it down on the course you wish to determine, so that its center mark shall be on a meridian line, you at once read off the true course on the divided edge, where it is cut by the aforesaid meridian line. The ruler is to be had in several sizes; but the smaller ones, from the minuteness of the angular divisions, are not to be recommended. The 18-inch ruler will be found very convenient, and the marking clear and well defined.



DIVIDERS.



Transparent Course Protractor, with straightedge ruler, instead of silk cord. Place the center of protractor over departure and line up as already explained. Turn the straightedge or radial arm to point of destination, and read the course on the circumference edge of compass.

THE PROTRACTOR.

The semi-circular protractor is a mathematical instrument for laying off and measuring angles; it consists of a graduated arc of degree divisions, and is usually made of brass or horn. It is of various forms, semi-circular and circular. The semi-circular protractor is graduated, (the degree marks at the circumference), as you will see from illustration, are numbered from 0° at B to 90° at D and 180° to C, also the reverse, from 0° at C to 90° at D and 180° to B. This latter scale is the inner one of the two. By this system the angle can be read from any quadrant and from either end, since either B or C can be used for a starting point. The protractor is a very handy and simple instrument, and no navigator's outfit is complete unless he has one of them, and it should be a good one. Do not get one with a radius less than 4 inches, which is a good serviceable size, inasmuch as it admits the marginal divisions to be large and well defined.

It is simply wonderful the number of difficult problems that can be solved by this little instrument, and it can be used in various ways. It is a handy means for laying off courses and can be employed in conjunction with the parallel ruler, or yard stick, or a straight-edge of any kind, to a degree of accuracy.

THE ORDINARY PROTRACTOR.

The ordinary protractor is graduated to 90°, B and C being 0° and D 90°. The latter method of graduations is probably more convenient in navigational practice, that is, in laying off courses, etc., since the angle of the course can never be more than 90° (an acute angle), but in measuring angles over 90° (an obtuse angle) it is more convenient to have the graduations to 180° both ways.

The point marked A on the Protractor represents the vertex (center) of the instrument and is to be placed over the vertex of the angle to be measured.

To use the protractor, proceed as follows:

Having the chart on the table, with its north side from you as usual, lay the straightedge over the course you wish to steer or determine; and place close against it (edge to edge) the protractor, sliding the latter along (its straight side always being in contact with the ruler) till its center mark comes fair over any meridian line on the chart; the exact true course in degrees will be found at the circumference, where the latter is cut by the same meridian line, thus:

The horn protractor can however, be rendered of equal service without any kind of straightedge, by the simplest possible contrivance. Bore a fine needle-hole at its center mark, and another about a quarter of an inch below it; through these two holes reeve a couple of feet of silk thread (cotton thread will do), and knot one end; keep the knot on the top side of the lower hole, so that it will not prevent the protractor from lying flat on the chart, and bring the other end up through the puncture at the central point, and haul it taut.

To ascertain a course or bearing, it is merely necessary to lay the protractor with its zero line on any conveni-

The above illustration shows the working principle of the Kay parallel ruler. By its use there is no climbing to be done, and one step between course and compass gives the course instantly. Another advantage it has over other rulers is that it is transparent, so that all soundings and other objects on the chart can be seen through it. The manufacturers say that by its use mistakes are absolutely impossible; always parallel and rectangular; positive, convenient and reliable.

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ent meridian, sliding it toward the north or south, so that the thread when stretched may lie exactly over the two positions on the chart between which it is required to know the course.

AROUND THE GREAT LAKES.

The steamer Faustin has been sold by John Solon and others of Toledo to John Mullen, of Windsor, Ont.

The passenger steamer Frontenac left Bay City on Monday night for Cleveland, thus introducing the new Cleveland-Bay City route.

The Empire Engineering Corporation of New York has chartered the tug Cresswell for use in the work of improving Black Rock harbor.

The dredge Alfred E. Hunt has been completed by the Port Huron Construction Co. for the St. Lawrence River Power Co. The dredge is 120 ft. long, 43 ft. beam and 11 ft. deep.

The Davidson steamer Cartagena now on her way to the Atlantic coast is receiving a new rudder and sleeve at the Detroit dry dock, having struck hard while coming down from Bay City.

The steamer John R. Stirling, formerly the Vanderbilt, has been purchased by the Northern Michigan Line and will be used in the freight service between Chicago and northern Michigan points.

Notice is given by the light-house engineer that at the end of the present month the Fourth-Order Fixed White Light varied by a white flash every thirty seconds at the Milwaukee light station will be permanently discontinued.

The steamer D. O. Mills which was built at the Ecorse yard of the Great Lakes Engineering Works for the Mesaba Steamship Co., of which Pickands, Mather & Co. are managers, left on her maiden trip on Tuesday of this week.

The Detroit & Cleveland Navigation Co., has just put out a card announcing that the season of navigation for 1907 is now in full bloom. It is noted that the time card for Cleveland has been changed from 10:15 to 10:45 p.m. which is a very sensible change.

The steamer Selwyn Eddy which was sunk in collision with the barge Maida in the Detroit river has been raised by wrecking master Harris W. Baker. After temporary repairs are made the Eddy will proceed to Milwaukee with her cargo of coal.

Oliver Donaldson of Buffalo has bought the wrecked steamer Vega for $175. The Vega, which was owned by the Gilchrist Transportation Co. was wrecked on South Fox Island two years ago. She has been on the rocks since November, 1905, and is in bad shape.

A board of United States engineers consisting of Col. H. M. Adams, Col. Charles E. L. B. Davis, Major J. G. Warren, Capt. Harry Burgess and First Lieutenant Arthur Williams, are at present making an inquiry into the harbor situation at Duluth. Their findings will be published in the next issue of the REVIEW.

The steel passenger steamer Manitou has been purchased by the Northern Michigan Transportation Co. of Chicago from the Manitou Steamship Co., and will be operated between Chicago and northern Michigan ports. The Manitou is 274 ft. keel and 42 ft. beam and was built in Chicago in 1893.

Tugs and scows are removing the soft coal cargo of the steamer Panama which went ashore at Ontonagon last fall. The coal has been purchased by Bart Hawley and Hugh D. McKenzie, of Ontonagon. The Panama was badly damaged and it is probable that no efforts will be made to save the hull after the machinery has been removed.

Bulletin No. 19 issued by the Submarine Signal Co., Boston, Mass., contains reference to the submarine signal service on the lakes. It shows that the steamer Samuel F. B. Morse heard the Point Au Pelee bell at a distance of ten miles and later picked it up at a distance of twelve miles. The Rensselaer picked up the Point Au Pelee signal at a distance of five and a half miles.

Capt. W. C. Richardson has sold the schooner Mary B. Mitchell to the Seaboard Transportation Co. of New York. She will be towed to her destination by the steamer Wm. Chisholm which has also been purchased by the Seaboard Co. Both vessels will be placed in the coal trade between Newport News and New England ports. The Mitchell was built in 1888 and is 211 ft. keel and 37 ft. beam.

Major Fitch, United States engineer, received only one bid for the construction of the steel tug suitable for his work. This bid was submitted by the Racine Boat Manufacturing Co., Muskegon, Mich., at $51,500. As the amount available is only $36,000, Major Fitch was compelled to recommend that the bid be rejected. Meanwhile the tug Zenith belonging to the Union Towing & Wrecking Co. is doing his work.

The steamer Eastland which was recently purchased by the Lake Shore Navigation Co. to operate on Lake Erie between Cleveland, Cedar Point and Toledo, will not hereafter make the Toledo run but will confine its route to Cedar Point. There were many obstacles encountered in going up the Maumee so that the Eastland could not observe her schedule to pick up Cedar Point passengers on her return trip at six o'clock.

The Barry Transportation Co. is the first of Milwaukee passenger lines to enlarge the port holes and dead lights on its boats. The work of altering those in the steamer Pere Marquette No. 5 was begun this week, and after these have been changed the port holes on the steamer Empire State will be made larger.

Fire broke out in the engine room of the steamer E. A. Shores, Jr., while taking on fuel at the Port Royal dock at Sault Ste. Marie last week. Notwithstanding the fact that the city fire department responded promptly it was not until the vessel had settled on the bottom from the weight of the water that poured into her hold that the flames were subdued. Her cargo of hard wood lumber shifted meanwhile and she listed badly in settling.

Capt. W. W. Smith, marine superintendent for the Pittsburg Steamship Co., will undertake the work of raising the steamers H. W. Smith and Nottingham which stranded at Buffalo. Capt. Smith will use the same wrecking outfit that was employed in raising the steamer Crescent City which was blown ashore in the great gale of November in 1905 on the north shore of Lake Superior. This outfit includes sixteen 125-ton jacks and four 100-ton purchase blocks.

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE EASTERN DISTRICT OF MICHIGAN, NORTHERN DIVISION: IN ADMIRALTY.

In the Matter of the
Petition of Frank S. Upton, owner of the steamer John C. Gault, for Limitation of Liability.

The undersigned, Hezekiah M. Gillett, a trustee appointed by this court in the above proceedings under the provisions of the Revised Statutes of the United States respecting limitation of liability, was authorized and empowered by the order of this Court made and entered on June 14, 1907, to cause the said Steamer John C. Gault, her engines, boiler, machinery, boats, tackle, apparel and furniture, to be sold as said property now lies, at public auction.

Now, therefore, by virtue of said order, *notice is hereby given*, that I shall cause to be sold at public auction, to the highest bidder for cash, at the front door of the Post Office Building, so called, on Washington Street in Bay City, Michigan, that being the building in which are held the sessions of the District and Circuit Courts of the United States for the Northern Division of the Eastern District of Michigan, on Saturday, the 6th day of July, 1907, at 2 o'clock in the afternoon of that day, the said Steamer John C. Gault, her engines, boiler, machinery, boats, tackle, apparel and furniture as said property now lies.

Dated, Bay City, Michigan, June 17th, 1907.
HEZEKIAH M. GILLETT, *Trustee.*
Bay City, Mich.

Shaw, Warren, Cady & Oakes, Detroit, Mich.
Proctors for petitioner.

Gray & Gray, Detroit, Mich.
Proctors for libelants in principal case.

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MARINE PATENTS.

850,473. Governing Device for Marine Engines. Wilhelmus J. H. Fresen, Brussels, Belgium.

850,633. Protective Device for Fragile Vessels. Samuel Ferguson, Schenectady, N. Y., assignor to General Electric Co., a corporation of New York.

850,643. Apparatus for Transporting and Launching Boats. John J. Harpain, San Francisco, Cal.

851,693. Device for locating and raising sunken boats. Charles L. Slattery and Semion Sambur, Chicago, Ill.

851,824. Means for projecting and anchoring life lines. Albert Meyer and Frank N. Rogers, Seattle, Wash., assignors to Meyers-Rogers Projectile Co., Seattle, Wash.

852,380. Boat. Guillermo A. Farini, Toronto, Ont., Canada, assignor of one-half to Rensselaer Hunt, Hamilton, Can.

852,646. System of Submarine Signaling. Lucien I. Blake, Lawrence, Kas., assignor to Submarine Signal Co., Boston, Mass., a corporation of Maine.

852,647. Submarine Signaling. Lucien I. Blake, Boston, Mass., assignor to Submarine Signal Co., Boston, Mass.

852,648. Art of Submarine Signaling. Lucien I. Blake, Boston, Mass., assignor to Submarine Signal Co., Boston, Mass., a corporation of Maine.

852,649. Transmitter for Systems of Submarine Signaling. Lucien I. Blake, Boston, Mass., assignor to Submarine Signal Co., Boston, Mass., a corporation of Maine.

852,760. Receiver of Systems of Submarine Signaling. Lucien I. Blake, assignor to Submarine Signal Co., Boston, Mass., a corporation of Maine.

852,987. Barge, Boat and Similar Vessel. George W. Theiss, Pittsburg, Pa.

853,233. Propeller. Alois Flad. New York, N. Y.

853,347. Boat. Amedee Fayol, Bordeaux, France.

853,723. Means for calking vessels. Vincen P. McVoy & Roswell B. King, Pensacola, Fla.

853,999. Propeller. Wilhelm Schmid, Schaffhausen, Switzerland.

854,004. Submarine Boat. Lawrence Y. Spear, Quincy, Mass., assignor to Electric Boat Co., New York, N. Y., a corporation of New Jersey.

854,112. Propeller for Vessels. Hugh R. Shaw, Rosseau, Ont., Canada.

854,146. Submarine Boat. John M. Cage, Denver, Colo., assignor of one-half to James C. Harvey, Denver, Colo.

854,241. Paint for Ships' Bottoms. George G. Schobert, Birmingham, England.

854,685. Propeller. John Bermes, Union, N. J., assignor of one-fourth to Daniel Crossley, Union, N. J.

855,062. Boat. Wallace Kirkpatrick, Savage, Minn.

855,131. Screw Propeller. Wenzel Preidel, London, Eng.

855,154. Ship Construction. Washington I. Babcock, New York, N. Y.

855,165. Device for Propelling and Steering Vessels. William O. Cutter, Natick, Mass.

855,238. Sail-Reefing Apparatus. John V. Ericson, Chicago, Ill.

855,890. Life Saving Device for Boats. Jules Husser, Pittsburg, Pa.

856,096. Means for Recovering Submarine Boats. Eugene Oswald, U. S. Navy.

BOOK REVIEW.

"The Marine Steam Turbine," second edition. A practical description of the Parsons marine turbine as presently constructed, fitted and run. By J. W. Sothern. Illustrated. Whitaker & Co., Paternoster square, London. 1906. Supplied by the MARINE REVIEW for $2.

In this second edition of "The Marine Steam Turbine" more complete details relating to the practical construction and running of turbines are supplied than previously and a large number of new original sketches and photographs illustrate the text. The author has had exceptional opportunities for observing the many details of marine turbine construction and the clear text, together with the numerous drawings and half-tones made from the various working parts of actual turbines under construction are of much value.

PERSONALS.

Marvin Briggs, Inc., and J. Marvin Briggs announce the transfer of their office from 17 Battery place to the Tribune building, 154 Nassau street, New York.

James Inman, chief engineer of the John W. Gates, has come back to his first love. He has been chief of the McDougall for two seasons, going to her from the Gates, where he was assistant engineer. The same skipper was aboard then who sails her now. Geo. Emery, his first assistant, was second assistant with him on the McDougall last season. Ernest Oehlenschlager, second assistant, oiled on the McDougall two seasons ago. Chas. Bergmark, oiler, fired on the McDougall two years ago, and Mike Martin, fireman, worked in the same capacity on the whaleback. There are only one or two in the after end who were not on the McDougall with Inman in his two years as chief.

Wm. H. Phillips, who is chief engineer of the whaleback steamer Frank Rockefeller this season, hails from Marine City. Last year, he was chief of the Ericsson with Capt. Ed. Whitney. Mr. Phillips has a record for keeping the crew to lay up with which he fits out. He has two oilers and two firemen from his home town.

TRADE NOTES.

The Independent Pneumatic Tool Co., First National Bank building, Chicago had a complete exhibition of Thor pneumatic tools and appliances at the Railroad Master Mechanics' and Master Car Builders' Convention at Atlantic City.

The Atlantic Works, Inc., Twenty-eighth street and Gray's Ferry road, Philadelphia, Pa., recently received an order from the Newport News Ship Building & Dry Dock Co., Newport News, Va., for one of their B-11 adjustable bevel band saw machines, and one of their A-4 extra heavy improved dimension planing machines. Both of these machines are built especially for ship yard work.

The MARINE REVIEW recently related the experiment with submarine signaling in the waters of Boston harbor near Boston light. This experiment was an endurance test which began on March 30 and was completed by May 16, during which time the bell continuously struck twenty-two blows per minute or a total number of 1,032,930 strokes. During that time neither the cable, the bell, the generator nor the oil engine required any overhauling or attention whatever. The engine operating the generator was a 2½-H. P. Mietz & Weiss oil engine, manufactured by the August Mietz Iron Foundry & Machine Works, 128 Mott street, New York. The electric bell was designed by Edward C. Wood, master mechanic of the Submarine Signal Co., of Boston.

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